



Introducing the Melodic Transcription (MeT) Scale for Language Documentation and Application

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Community

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(NAMA program)

Linguistics

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Computer Sci.

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Native speaker Comp. scientist Undergrad RA Graphic designer
Earl Old Person Mitchell Lee
Caroline Allen Kaylene Big Knife



Blackfoot language teachers
Jesse DesRosier Emmette DustyBull



Blackfoot language learners:
UM students in Blackfoot classes



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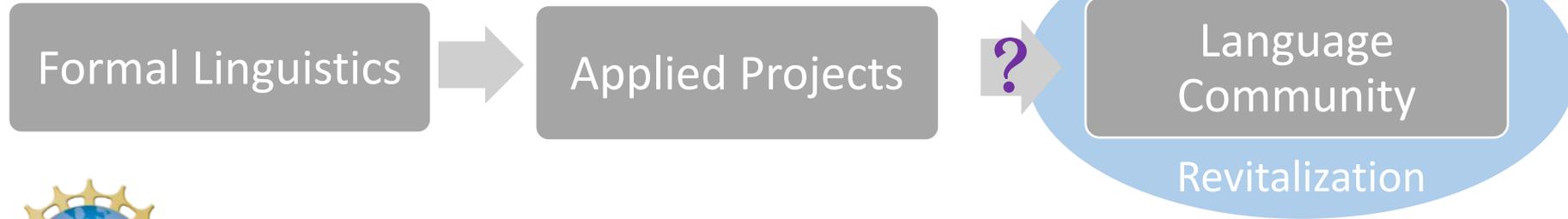


U of Washington Bothell
CSS Research Support

FORMAL LINGUISTICS AND LANGUAGE REVITALIZATION

Lack of applied work in Indigenous languages

(Penfield & Tucker 2011)



Broader impacts: The potential for a research project to benefit society or advance desired societal outcomes (NSF)

Community-Based Research (CBR): research conducted on, for, with the community (e.g., Czaykowska-Higgins 2009; Rice 2011, 2018)

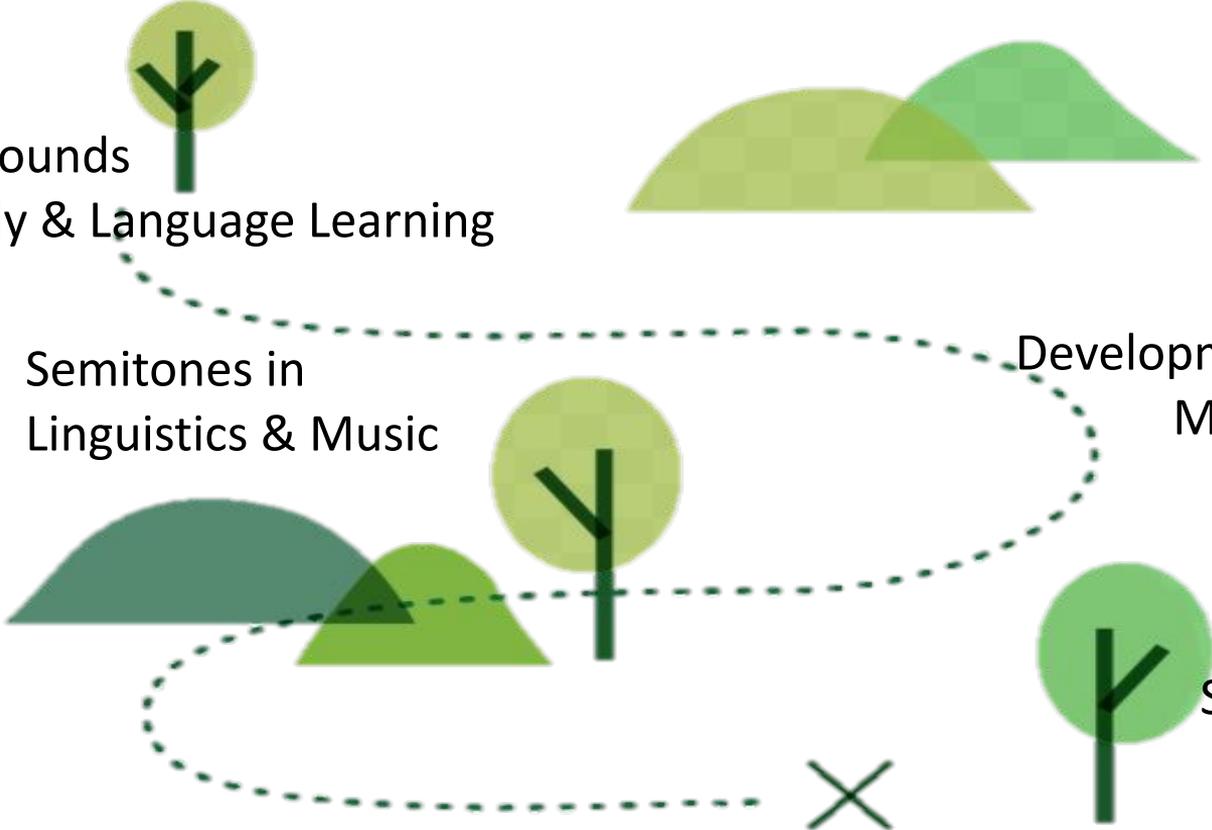
ROADMAP: TALK OUTLINE

Backgrounds
Prosody & Language Learning

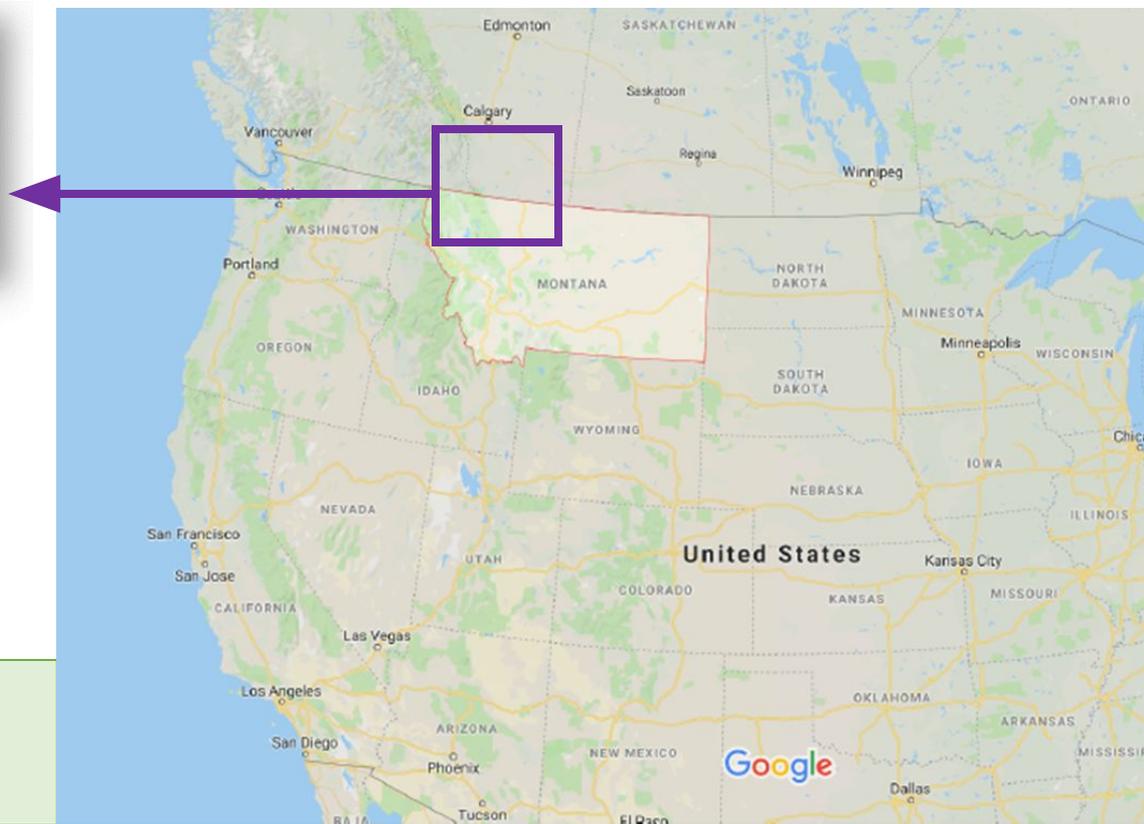
Semitones in
Linguistics & Music

Development of
MeT-scale

Summary and
Significances



BLACKFOOT (ALGONQUIAN)



Speakers:

2,750 in Canada (Statistics Canada 2017)

50 or less in US (p.c. Darrell Kipp 2011)

PRONUNCIATION & COMMUNITY CONCERNS

Elderly native speakers' strong ties to language ideology leads to Insistent on accurate pronunciation (Fish 2018)

Being able to produce *authentic* pronunciation is a way to honor elders (Bird & Kell 2017)

PRONUNCIATION

Pronunciation learning technique is understudied (McIvor 2015)

Knowledge in pitch is implicit; Existing linguistics materials are impractical for teaching

FOCUS ON PITCH MOVEMENT



káánaisskiinaa
[ká:nes:ki:na:]



saahkómaapi
[saxkóma:pi]



napayínni
[napajín:i]

H* **not helpful** L* H*

Collaboration – community stakeholders & researchers

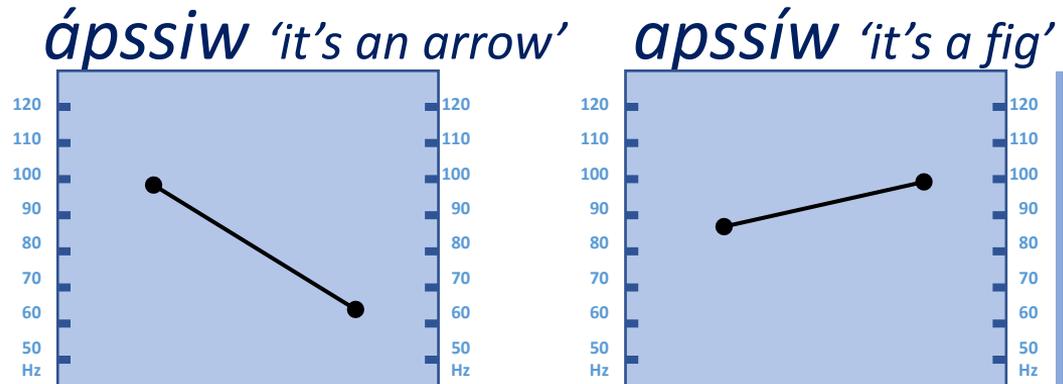
FOCUS ON PITCH MOVEMENT

Research design – address the needs of the community, building on what has been known and studied

Accented syllable is realized with highest pitch in a word (Frantz 2017)

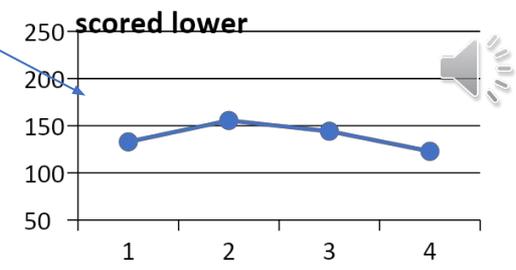
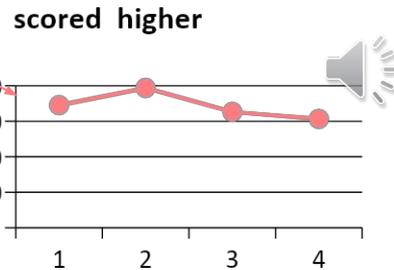
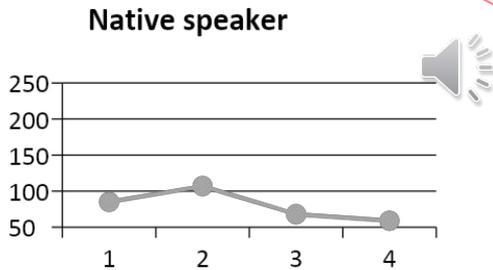
Pitch best represents the lexical/inherent acoustic correlates of Blackfoot word prominence (Miyashita 2019)

- Pronunciation is the same except for the pitch
- Pitch movement is not exactly mirroring each other



Saahkomaapi 'boy'

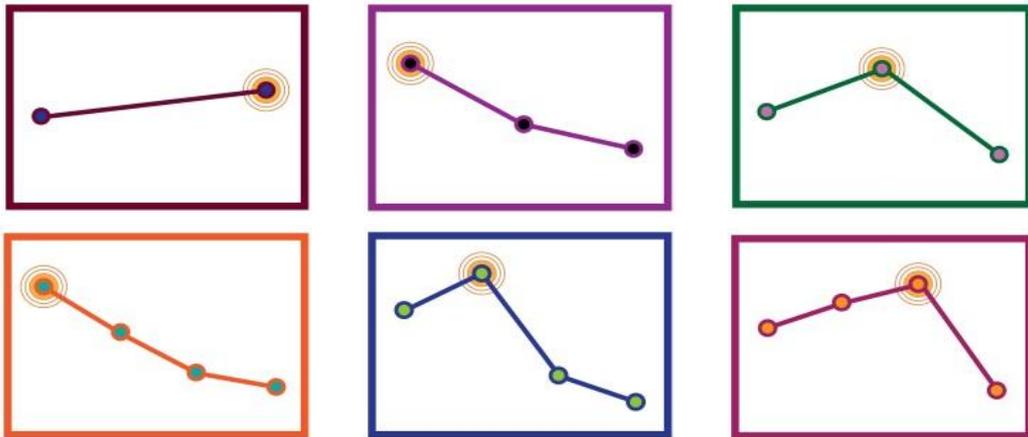
	A	B	C	D	E	F	G	H	I
Highest on the second	✓	✓	✓	?	✓		✓		
Score (1-7)	6	6	6	6	4	4	3	2	2



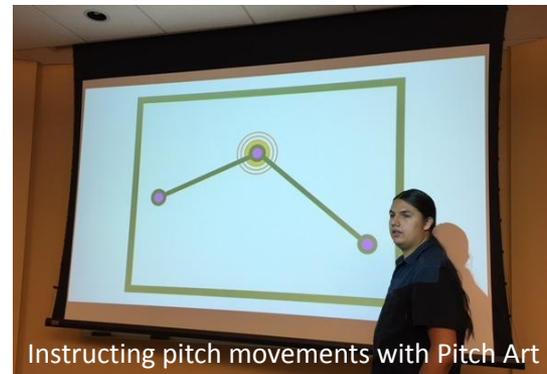
Perceiving & producing correct Blackfoot pitch movement is not intuitive tasks for English speaking L2 learners

“... visual feedback combined with the auditory feedback ... is more effective than auditory feedback alone.” (Anderson-Hsieh 1994:6)

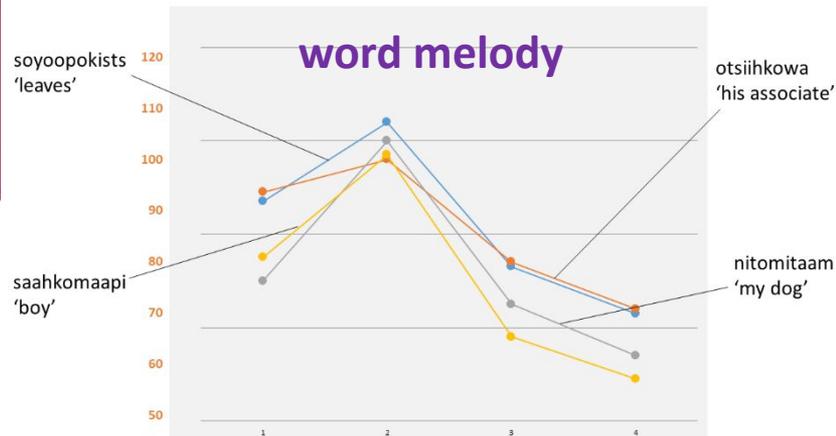
Pitch Art: Visual guide of Blackfoot word melody (Fish & Miyashita 2017)



Pitch pattern of 4 syllable words with accent on the 2nd syllable (Fish & Miyashita 2021)



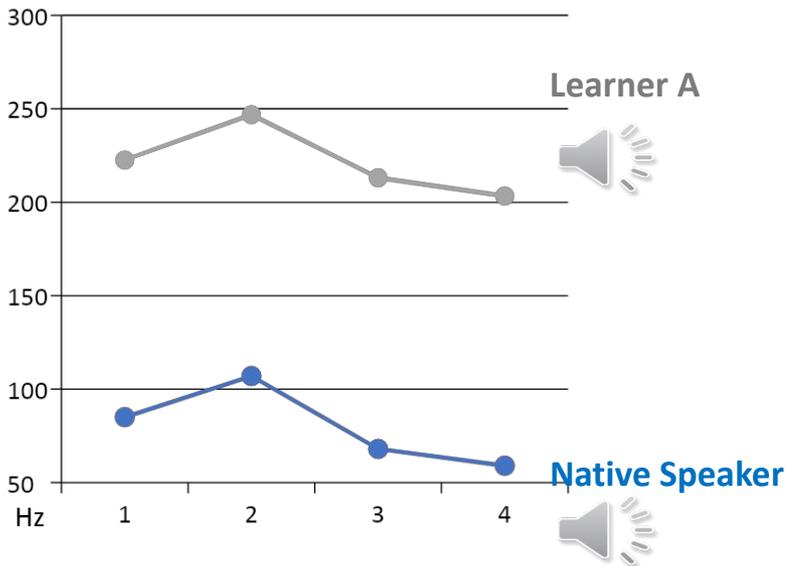
Instructing pitch movements with Pitch Art



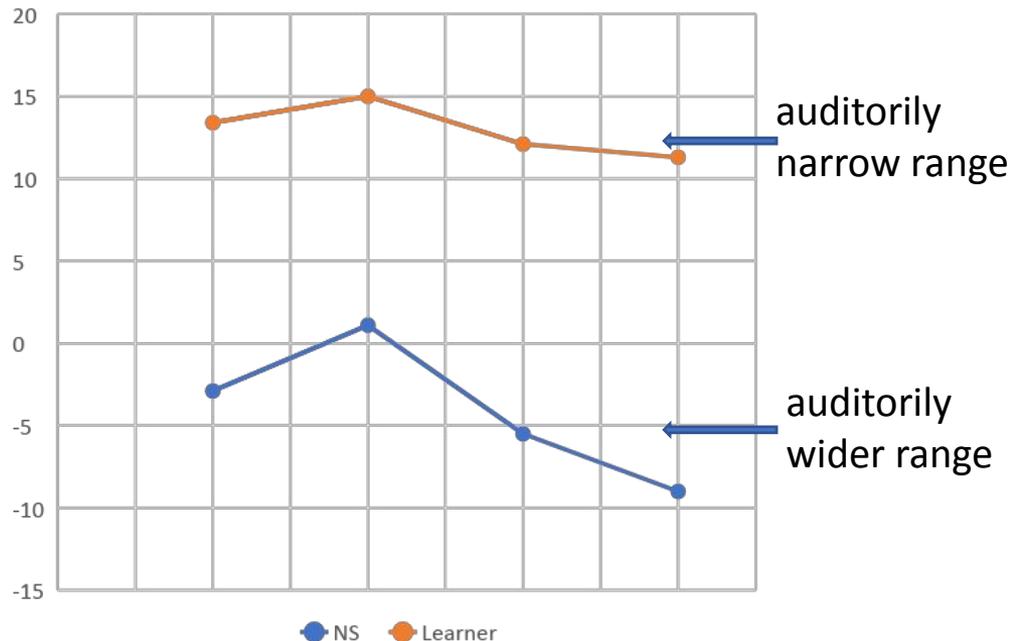
Hz TO PSYCHOACOUSTIC SCALE

Sample:

[saxkumaapiw] 'boy'



Psychoacoustic scale



L2 learners: students recorded in Spring 2017, NS recorded in 2013

SEMITONE TO MeT SCALE

Semitone-scale in research

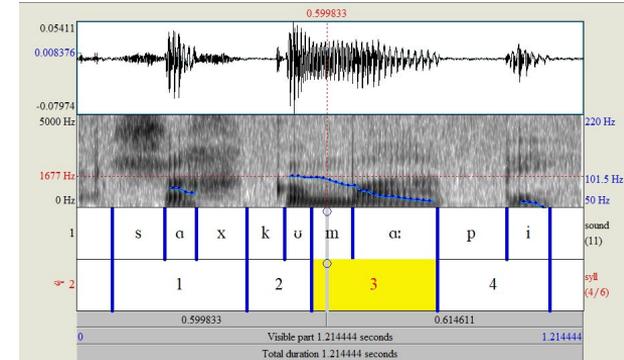
- Common in well-studied languages (e.g. Mandarin, Cantonese, and Japanese, Wong and Diehl 2003).
- Unusual among linguistics research in Indigenous languages of North America.

Semitone-scale as the base:

- Semitone scales best reflect perception (Nolan 2003; Zhang 2018)
- Already in many people's lives (e.g. tonal music scale)

Modified scale

- New form based on the semitone and music scales to better represent pitch movements for pedagogical purposes.



musictheorysite.wordpress.com

Melodic Transcription

MeT-Scale

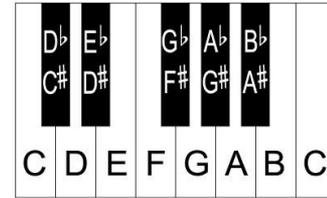
SEMITONE IN MUSIC & LINGUISTICS

Semitone

- Logarithmic frequency scale
- Octave = 12 semitones

Music

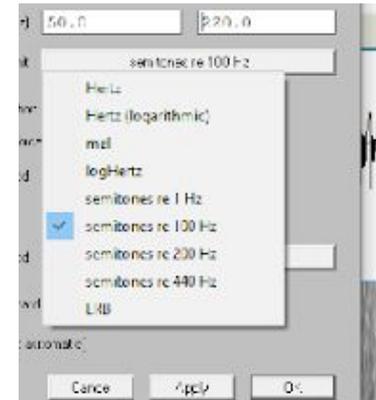
- the smallest interval in Western tonal music
- distance between two adjacent notes in a 12-tone chromatic scale



exceldevelopmentplatform.blogspot.com/2018/06/vba-beep-octave.html

LINGUISTICS

- used in tonal language research
- values shown w/ + & - semitones from a reference point (e.g. 100Hz)
- Praat:
1Hz, 100Hz, 200Hz, & 440Hz.

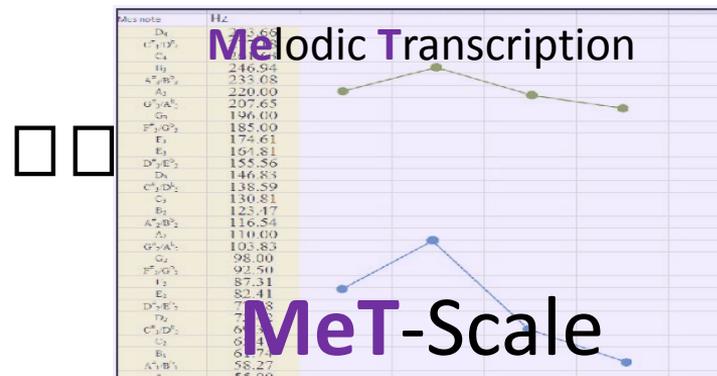
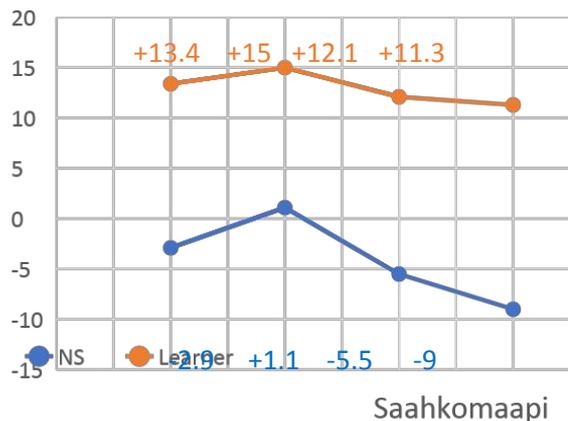
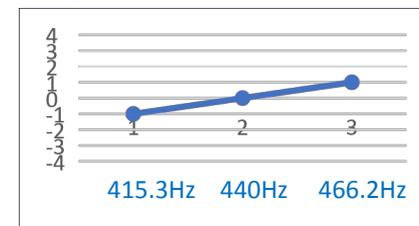
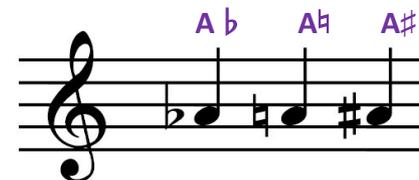


Music notes	A ₂	A [♯] ₂	B ₂	C ₃	C ₃ [♯]
FO (Hz)	110	116.5	123.5	130.8	138.6
St ₁₀₀	1.7	2.6	3.6	4.6	5.6
St ₂₀₀	-10.3	-9.4	-8.4	-7.4	-6.4

SEMITONE & TONAL MUSIC SCALES

Semitones	Unique names	Perceptual match
Music	✓	Ideal scale No
Linguistics	No	Characteristics ✓

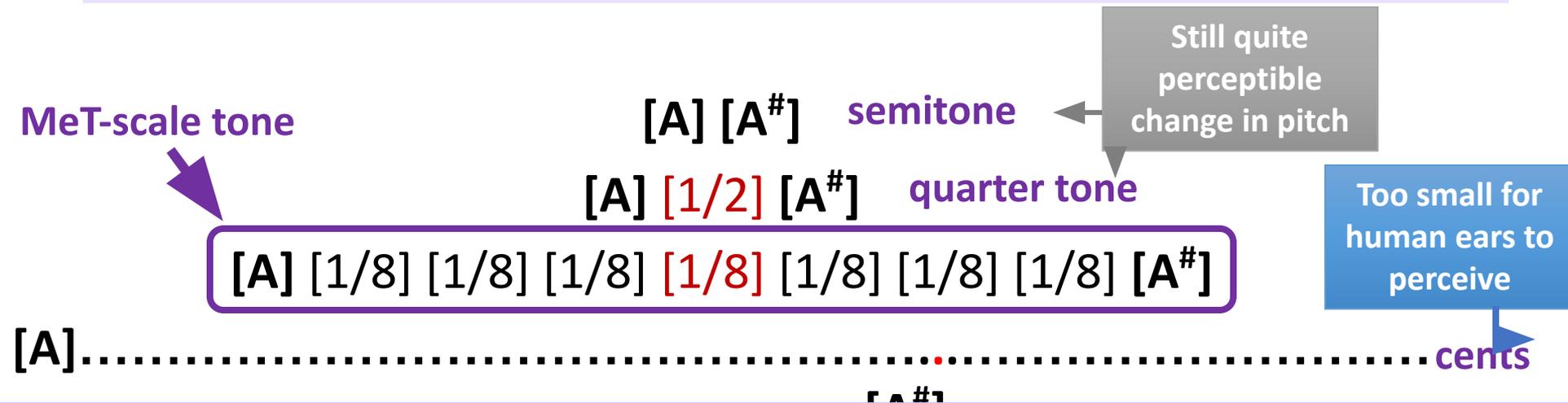
Ideal scale has both



MELODIC TRANSCRIPTION (MeT) SCALE

Derived from musical notation

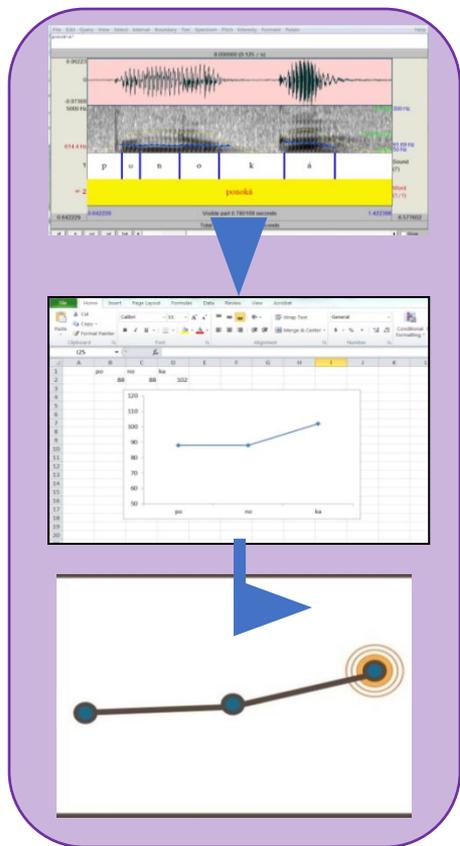
- More precise than semi-tone
- Quarter-tone scale & cents
- Just Noticeable Distance (JND) is 5-8 cents (Rossing 1990)
- Immediately above the JND (12.5 cents)



MELODIC TRANSCRIPTION (MeT) SCALE

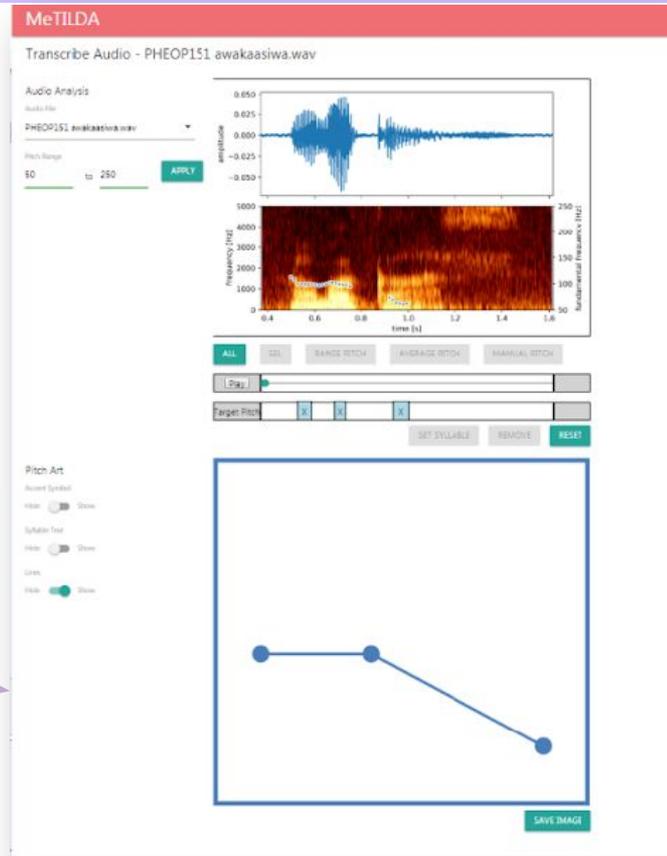
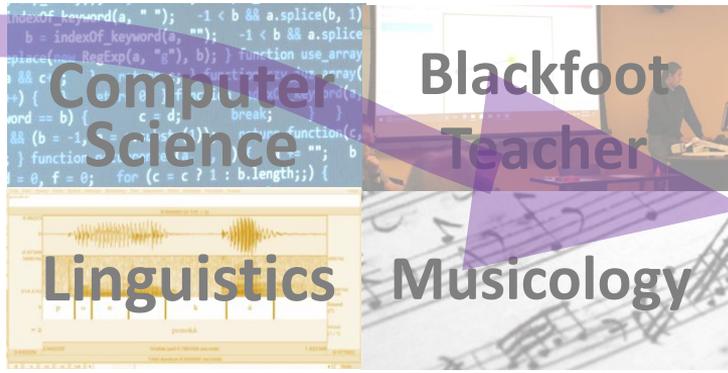
MeT scale: between A_2 and $A\#_2$

MeT	$[A_2]$								$[A\#_2]$
F0 (Hz)	110	110.8	111.6	112.41	113.22	114.04	114.87	115.7	116.54
Cents	+0	+12.5	+25	+37.5	+50	+62.5	+75.5	+87.5	+100



MeT-scale implemented in MeTILDA

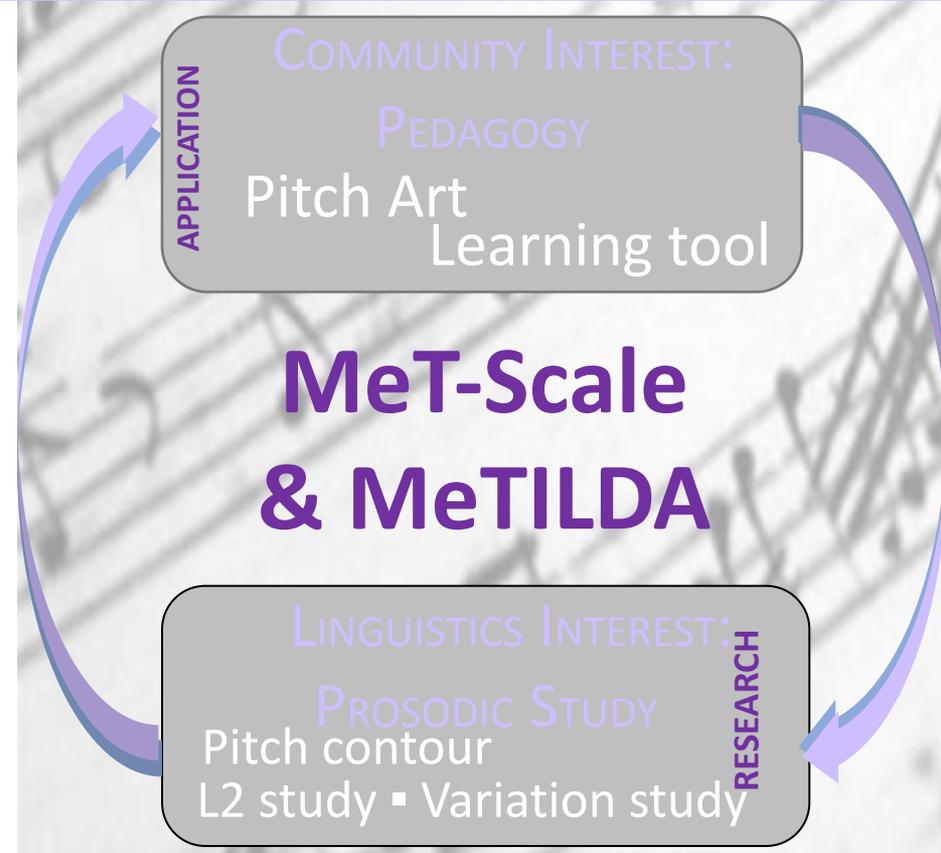
One application for Pitch Art



SIGNIFICANCES

MeT Scale in MeTILDA

- Community-Based Research
- Contribution to the community stakeholders' activities
- User-friendly
- Potential use for other language communities
- Potentially useful for song transcription
- Reciprocity



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Niiksiksima'tsi'tsiihpinnaan
ご清聴ありがとうございました
谢谢您的聆听
Thank you

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